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AN EVALUATION OF THE BIRD/AIRCRAFT STRIKE HAZARD (BASH) WURTSMI--ETC(U)
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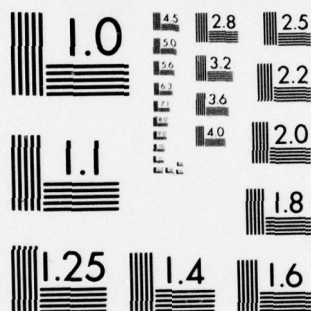
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WURTSMITH AIR FORCE BASE, MICHIGAN.

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JOSEPH M. LAVEY, CAPT, USAF
JAMES S. KENT, CAPT, USAF
ARDRAH L. BUDDIN III, SSGT, USAF

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The bird/aircraft strike hazard (BASH) at Wurtsmith Air Force Base, Michigan was surveyed during the period 22 May to 2 June 1978. Special emphasis was placed on local gull activities which contribute significantly to the bird strike potential. Recommendations aimed at reducing the airfield bird strike potential are part of this report.		

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PREFACE

This study was performed under Program Element 91212F, AFETO JON 00DEVN11. Inclusive dates of the study were 22 May to 2 June 1978.

The authors wish to thank control tower personnel, security police, and Major Jay Borden in Base Operations for their assistance in gathering information and coordinating this survey.

For your quick reference and use, a concise summary of observations and recommendations follows the table of contents.

This memorandum has been reviewed by the Information Office (OI) and is releasable to the National Technical Information Service (NTIS). At NTIS it will be available to the general public, including foreign nations.

This memorandum has been reviewed and is approved for publication.

Jeffrey J. Short
JEFFREY J. SHORT, Capt, USAF
Chief, BASH Reduction Program

William M. Kornman
WILLIAM M. KORNMAN
Chief, Natural Resources Division

Sterling E. Schultz
STERLING E. SCHULTZ, LtCol, USAF
Director of Environmental Planning

George E. Ellis
GEORGE E. ELLIS, Colonel, USAF
Commander

ACCESSION for	
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SUMMARY OF OBSERVATIONS AND RECOMMENDATIONS

1. A bird/aircraft strike hazard exists at Wurtsmith AFB because of the following factors:

a. The base sanitary landfill is attracting large numbers of gulls and crows.

b. Gulls are loafing in clear areas around the airfield and may congregate on the runway.

c. Many small perching birds are feeding in short grass areas on the airfield.

d. Birds such as gulls and waterfowl overfly the airfield during migration seasons.

e. Raptors (birds of prey) were observed overflying the approach to Runway 06.

f. Aircraft hangars provide excellent habitat for small birds which build nests in B-52 and KC-135 aircraft cavities.

g. Wurtsmith AFB has a problem with whitetail deer on the airfield, creating a serious aircraft strike hazard.

2. Recommendations

a. The landfill should be closed as scheduled and seeded to prevent gulls from loafing.

b. Active scaring techniques, such as bird distress call tapes and the M74 airburst, should be used at the landfill.

c. Vary the food waste dumping schedule.

d. Clean up loose trash in the landfill area.

e. Continue allowing airfield grass to grow longer.

f. Establish a bird dispersal team using base operations personnel.

g. Bioacoustics (recorded bird distress calls), and pyrotechnics (shellcrackers, airbursts, and field loads), should be used to disperse birds from the airfield.

h. A Bird Hazard Working Group (BHWG) should be formed to prepare a plan for bird control or avoidance.

i. Similar to a MET WATCH, the term BIRD WATCH should be used to alert aircrews of possible flight hazards due to increased bird activity.

j. Aircraft must be closely inspected after maintenance for signs of bird nests within the aircraft. Nesting materials can cause serious damage, depending on their location.

k. A deer control fence should be installed.

l. The SOF should clear deer from the airfield at night before aircraft takeoffs or landings.

SECTION I

INTRODUCTION

1. Wurtsmith Air Force Base is a Strategic Air Command installation on the lower peninsula of Michigan, 3.2 kilometers (km) west of Lake Huron and 1.6 km north of Oscoda on Highway F-41 (figure 1, reference 1). The 379th Bombardment Wing, host unit on the base, accomplishes emergency or special missions assigned by higher headquarters and conducts combat crew training programs. Aircraft assigned to Wurtsmith include the B-52, the KC-135, and the T-37.
2. Wurtsmith occupies 2,106 hectares of land, 770 of which are unimproved. The airfield is located on a sand plain and has excellent drainage. Lakes, streams and marshes cover much of the region near the base. The AuSable River flows along the base's southern border, and Van Ettan Lake lies northeast of the base. Vegetative cover in the region is primarily second growth timber. The dominant tree in the area is the jack pine (Pinus banksiana), interspersed with Norway pine (Pinus sp.), small oak (Quercus sp.), aspen (Populus sp.), maple (Acer sp.), and elm (Ulmus sp.). Vegetative cover varies from 40 to 80 percent over the airfield. Plant species on the airfield itself include Kentucky bluegrass (Poa pratensis), red fescue (Festuca rubra), quackgrass (Agropyron repens), dandelions (Taraxacum sp.), Russian thistle (Salsola kali tenuifolia), and wild strawberries (Fragaria sp.) (reference 2).
3. Wurtsmith has bird/aircraft strike hazards, as well as a problem with deer on the airfield. During the past year, bird strikes caused \$48,780 in loss to aircraft in the Wurtsmith area (Appendix A). Wurtsmith AFB Regulation 55-10 outlines a program to minimize the risk of bird strikes on or near the runway (Appendix B). The purpose of this survey is to identify specific bird problems, recommend solutions, and provide information to increase effectiveness of the base bird control program. The problem of deer on the airfield is also addressed.
4. All birds were identified using Birds of North America, while mammals were identified using A Field Guide to Mammals (references 3 and 4).

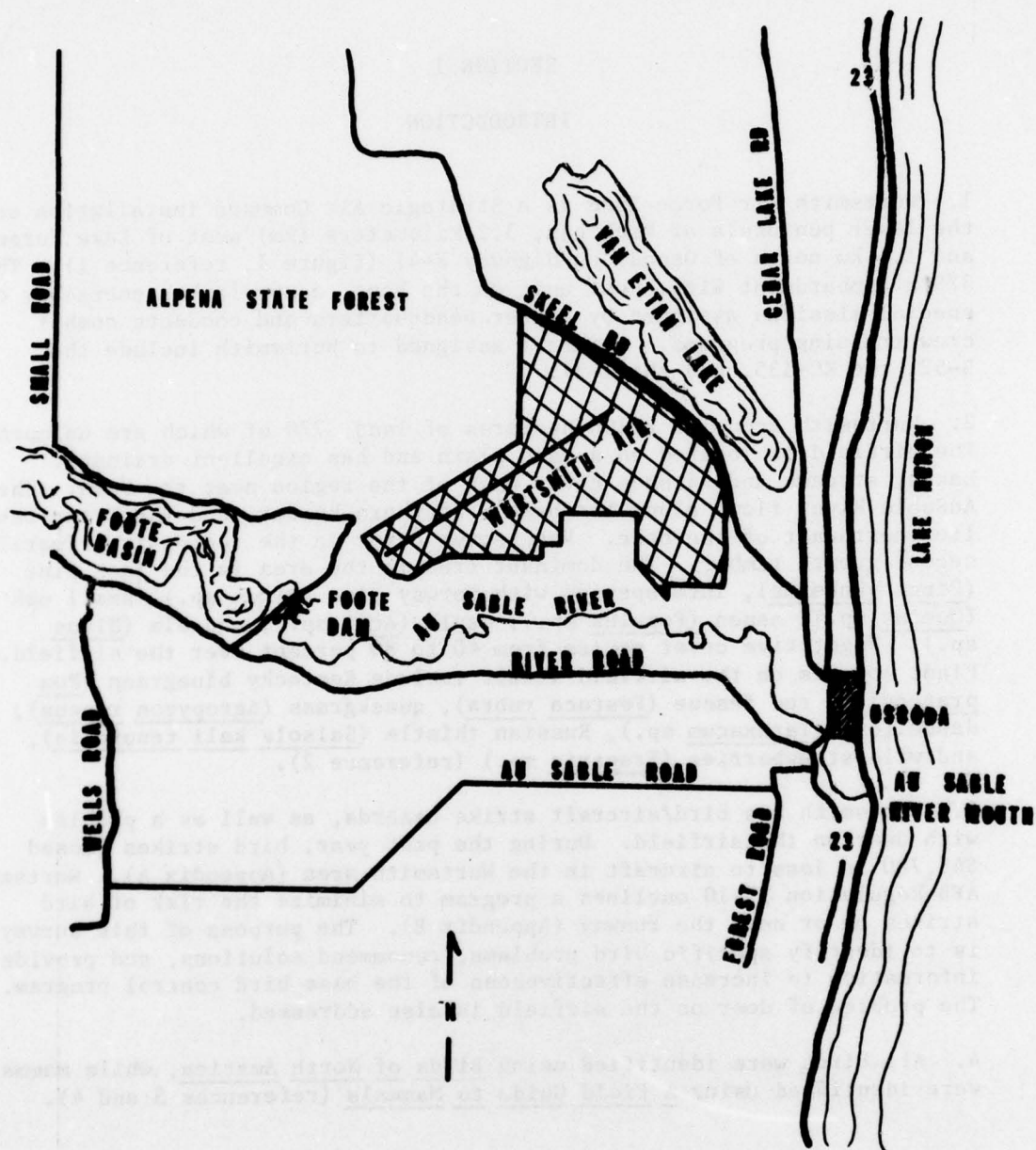


FIGURE 1
WURTSMITH AFB AND VICINITY

SECTION II

OBSERVATIONS AND RECOMMENDATIONS

Recommendations for each observation in this report are listed in order of priority. If lack of manpower or funds prevents implementation of some recommendations, subsequent recommendations should then be accomplished.

1. Landfill Operations:

a. The base landfill is located on the northeast end of the airfield near the alert pad and northwest of the departure end of Runway 06 (figure 2). It is operated in a clean, efficient manner using the trench method of waste disposal. However, it attracts large numbers of Ring-billed Gulls (Larus delawarensis), Herring Gulls (Larus argentatus) and Common Crows (Corvus brachyrhynchos). Because it is near the airfield, the landfill is a major factor in the bird strike hazard at Wurtsmith AFB. Waste disposal sites near airports significantly increase the potential for bird/aircraft collisions (reference 5). Gulls come to the landfill in large numbers to feed and loaf in the morning and are present until late in the day when waste is covered with soil (reference 6). Food wastes from the commissary and dining hall are dumped every other day in the morning. Gulls are aware of the schedule, and more birds wait at the landfill on those days when commissary and dining hall wastes are available. During the survey, few gulls were observed at the landfill because large schools of alewives (Alosa pseudoharengus) in Lake Huron and at the mouth of the AuSable River, attracted about 4,000 gulls to feed on this small, shad-like fish.

b. Older portions of the landfill are open, with little vegetative cover. Gulls rest in these open areas or fly a short distance to congregate in the short airfield grass near the alert pad or at the departure end of Runway 06.

c. Recommendations:

(1) Close the landfill. The landfill is scheduled to be closed in October 1978. Every effort must be made to meet this schedule. The landfill attracts large numbers of gulls and crows to the airdrome to feed. Closing the landfill will reduce the number of birds which fly over the departure end of Runway 06. Since gulls require open areas to loaf, the landfill site should be seeded with grass and trees. Plant jack pine to blend with existing vegetation so different habitats are not created.

(2) Use active scaring techniques at the landfill: Gulls feeding or loafing at the landfill present a hazard to aircraft by flying near the departure end of Runway 06. Although food waste is covered with soil as soon as it is deposited, some birds continue to

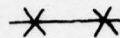
**FIGURE 2
WURTSMITH AFB**



GULL LOAFING AREA



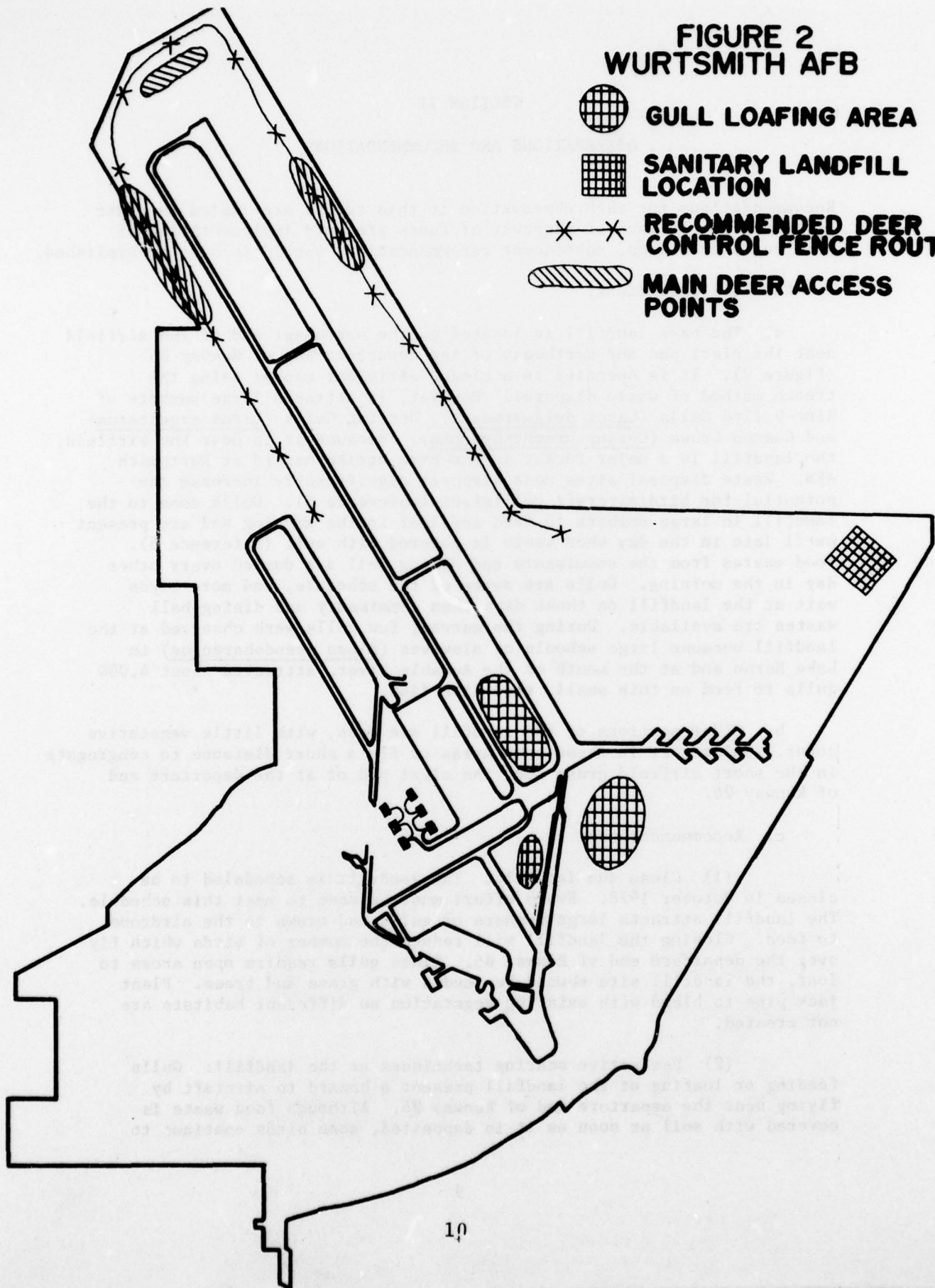
SANITARY LANDFILL LOCATION



RECOMMENDED DEER CONTROL FENCE ROUTE



MAIN DEER ACCESS POINTS



visit the area for shelter or roosting, unless they are dispersed by scaring devices (reference 5). Personnel at the landfill should notify Base Operations when gulls begin to congregate at the landfill. Members of the Bird Dispersal Team (defined later in this report) can then be dispatched to disperse the birds from the landfill. Active scaring techniques using bioacoustics and pyrotechnics (discussed later in this report) reduce the number of birds at the landfill. Scaring operations will momentarily increase bird activity over the airfield. Coordination with tower personnel will prevent scaring birds into the path of arriving or departing aircraft.

(3) Vary times when food waste is dumped: because food waste is deposited on a regular schedule, greater numbers of birds are present on the mornings when food waste is dumped. Dump refuse from the commissary and dining hall at varying times and on differing days to keep the birds from becoming habituated to a regular schedule. For example, the refuse should be dumped at 0800 one day, and at about 1500 the next. This practice of covering food waste with soil immediately after deposit should be continued because it reduces the length of time food material is available to the birds.

(4) Clean up loose trash in the landfill area: Birds, particularly gulls, associate small pieces of loose trash with food. Blowing paper and uncovered litter will attract these birds to a potential food source. Litter control will reduce landfill attractiveness to birds.

2. Grass Height Management:

a. Pavement and Grounds has begun a program to maintain longer grass on the airfield. Uncut grass near runways and taxiways at Wurtsmith varies from 15 to 20 centimeters (cm) in height. In many places the airfield supports high concentrations (30-35 percent of ground cover) of seed-producing weeds. Airfield drainage is good and no areas of high vegetation or standing water exist on the airfield. Gulls often come to the airfield to feed or loaf near the ends of the runway, particularly near the alert pad at the departure end of Runway 06 (reference 7). Many small perching birds are present on the airfield, feeding in the short grass. These perching birds are not a serious hazard to aircraft because of their size and intermittent feeding on the airfield.

b. Recommendations:

(1) Continue allowing grass to grow longer on the airfield. Grass height helps bird control on airfields and improves turf conditions. In the United Kingdom and other European countries, taller grass has reduced the number of flocking birds frequenting airfields by up to 50 percent (reference 8). Flocking birds such as gulls, Starlings, and blackbirds require a clear field of vision in all directions to maintain flock integrity and to allow early detection of predators. Taller grass prevents this and causes gulls to congregate on the runways and taxiways

where they are more easily dispersed. Permitting the grass to grow 20 to 30 cm improves the turf by producing a dense root system. This reduces seed-producing weeds and eliminates a food source for the smaller, seed-eating birds. Thirty cm is the maximum grass height that should be allowed. Longer grass supports increased numbers of rodents, attracting raptors (birds of prey). The grass height control program should include cutting the grass short (7.5 to 10 cm) once each year. This procedure helps in insect and rodent control. When grass is cut short, insects are exposed, attracting gulls and other birds. For this reason, the timing of the short cutting is important. We suggest the grass be cut short in early May each year. This is after the major spring bird migration, when rodent numbers are lowest, and when most gulls are feeding on alewives in Lake Huron. While low numbers of rodents, primarily thirteen-lined ground squirrels (Citellus tridecemlineatus), were observed on the airfield, allowing the grass to grow tall may increase populations. Following the first short cutting, grass should be grown and maintained at 20 to 30 cm throughout the summer. The last cutting should be early enough in the fall so the grass can grow to the required height before winter. Whenever tall grass is cut, vertebrate and invertebrate animals are exposed, attracting birds. Therefore, cut the grass when aircraft activity is lowest; grass cutting on weekends or at night may be required if birds are attracted to grass cutting operations.

(2) Extend the use of 2-4, D (2, 4-Dichlorophenoxyacetic acid) herbicide to the airfield. Dandelions, wild strawberries, and other broadleaf weeds grow abundantly on the airfield providing a food source for many birds. The present Pavements and Grounds program of applying 2-4-D to broadleaf weeds on part of the airfield, should be expanded to include the entire airfield. Any such spraying program must be conducted by certified personnel as outlined in AFR 91-21 and AFM 91-19.

(3) Seed construction areas with grass. Several areas of the airfield, currently being prepared for installation of new precision Instrument Landing System (ILS) equipment, are barren. Upon completion of construction activities, these areas must be seeded with a commercial grass mix to reestablish turf and prevent erosion. Seeding activities will attract birds to the airfield and should be limited to periods of low aircraft activity. Seeds should be tilled into the soil and stabilized with straw. After sprouting, the grass should be allowed to grow and be maintained from 20 to 30 cm high.

3. Active Bird Control.

a. Base operations has established a program of active bird control using shellcrackers fired from a 12-gauge shotgun. In addition, the base has a current depredation permit from the US Fish and Wildlife Service for killing gulls. At the present time, bioacoustics are not used, and a bird dispersal team has not been established.

b. Recommendations: No single method of active bird control is effective. A combination of techniques is essential to establish an effective program.

(1) Establish a Bird Dispersal Team. The base should establish a bird dispersal team using base operations personnel. Because rapid response is needed for bird dispersal and control, the maximum possible number of people should be trained to use bioacoustics and pyrotechnics. A quick reaction capability presently does not exist at all times because of the limited number of personnel qualified to disperse birds on the airfield. The Bird Dispersal Team must be able to react immediately upon notification that large numbers of hazardous birds are on the airfield. This will prevent exposing aircraft to increased bird strike safety hazards or unnecessary and costly delays. (The BASH Team can train bird dispersal personnel by having one person and his equipment come to the Air Force Engineering Technology Office, at Tyndall AFB. Prior coordination with the team is required for this training which could be accomplished in a two or three-day TDY.)

(2) The following equipment should be available at Base Operations for bird dispersal personnel use:

- * - Binoculars (NSN 1240-00-530095YP)
- A Guide to the Identification of Birds of North America by C. S. Robbins, B. Bruun, and H. S. Zim, Golden Press, New York, 1966
- * - Shotgun, single barrel (NSN: 1005-NC108097L)
- * - Pistol, Pyrotechnic, M-1 (NSN:1095-00-726-5657)
- Simulated Airburst, M-74 (NSN: 1370028-6007)
- Shotgun shells, 12-gauge #4 or 6-shot
- ** - Cassette tape player (NSN: 5835-01-053-3152)
- ** - Speaker, (NSN:5965-01-053-6210)
- ** - Amplifier, Mobile (NSN: 5830-01-054-4954)

* Indicates item authorized by TA 483

** Stocklist action has been completed and upon receipt of assigned NC/NSN items will be added to TA 483.

(3) Use bioacoustics. Bioacoustics is a control technique using recorded distress calls emitted by a bird under stress. These calls are species specific; what works for Herring Gulls may not be effective for Ring-billed Gulls. A speaker should be mounted on a vehicle equipped with sound equipment capable of producing distortion-free sound at 90 to 110 decibels with a frequency response between 12,000

and 14,000 Hz. In operation, personnel identify the species of bird and select the proper cassette tape. The vehicle is driven to within 100 to 200 meters (m) of the birds, and the distress call is played for 10 to 20 seconds and shut off. If the birds have not moved within 20 seconds, a second call of the same duration should be used. If the birds do not move by the third attempt, it is unlikely they can be moved by the distress tapes. Do not allow the tape to keep running. This will soon persuade the birds the danger is not real and cause them to ignore the tapes. With some species of birds, one or two minutes may be required to obtain the desired response from the distress calls. Frequently, when the distress call is used, the birds rise up and fly towards the loudspeaker. Sometimes they look for a short time at the "distressed bird" and then fly away. At other times, they may circle the vehicle flying higher and higher, creating a hazard to flying aircraft. Pyrotechnics must then be exploded among the birds to hasten their departure. It is helpful to reinforce the taped distress call with shellcrackers, airbursts, or by actually killing a few of the birds with a shotgun.

(4) Continue using pyrotechnics. Shellcrackers, airbursts and field loads are useful in bird control. Shellcrackers, presently used on base for bird dispersal, are available from local commercial sources at a cost of about \$0.25 a round. When fired from a shotgun, a noise-making projectile travels approximately 92 m and then explodes with a sharp noise and flash of light. When firing shellcrackers, operators should wear goggles, gloves and ear protectors, because this pyrotechnic has been known to explode prematurely. Use only an open-bore shotgun. Any choke on the barrel slows the projectile and induces premature explosion. The recommended pyrotechnic is the M-74 airburst. When fired from an M-1 pyrotechnic pistol, the airburst is very effective in dispersing and controlling flocks of birds. It is safer, has better range and produces a louder noise than shellcrackers.

The airburst has recently been authorized for use in bird control by HQ USAF and is available through Air Force supply channels. Bird shot should be used to kill one or two birds if they do not respond to other dispersal techniques. This reinforces the effect of bioacoustics and pyrotechnics and prevents habituation of birds to these scaring devices. The base's Federal Depredation Permit must be kept current in order to kill birds.

(5) Bird control personnel require immediate access to pyrotechnic devices to facilitate rapid deployment to remove bird safety hazards. Pyrotechnic equipment should be stored in base operations. Rigid safety controls must be established to issue, use, and store any pyrotechnic device, especially the M-74 airburst which is a Class B explosive.

(6) When using pyrotechnics, the operator should stop 90 to 140 m away from the birds. The pyrotechnic must be fired to scare the birds away from the runway. Prior coordination with the hospital,

security police, and the fire department is required whenever pyrotechnics are used on the airfield (reference AFR 127-100). Constant coordination with tower personnel is essential to prevent scaring birds into the path of arriving or departing aircraft. Under no circumstances should pyrotechnics be discharged close to aircraft. Two fire extinguishers are required whenever pyrotechnics are used.

4. Operational Changes and BIRD WATCH

a. Observation: to reduce aircraft bird hazards, base bird populations can be managed by habitat modification and population control. However, no program will completely eliminate all birds from the airfield. Birds such as gulls and waterfowl will overfly the airfield during migratory periods. During summer and fall, gulls will use the runway to loaf and insectivorous birds will overfly the area seeking food. Temporary operational changes, within mission constraints, may be needed to reduce the bird strike potential while birds are present.

b. Recommendations:

(1) Bird Hazard Working Group: A Bird Hazard Working Group (BHWG) should be formed to prepare a plan for bird control or avoidance. Flying Safety, Civil Engineering, Airfield Management, and Flight Facilities representatives should be included. This group will develop plans and procedures and delineate responsibilities for bird control. The group will also notify and inform pilots about bird hazards and coordinate operational changes to reduce the bird strike potential. The group should meet on a regular basis and may function as a part of the base's Air Traffic Control Board.

(2) After operational procedures are developed, they should be published as a portion of the plan and included as part of Wurtsmith AFB Regulation 55-10 to insure local aircrew compliance.

(3) Pertinent information on bird hazards should also be printed in the IFR Supplement to aid transient aircrews.

(4) To inform pilots of bird densities which require temporary operational changes, the term "BIRD WATCH" should be used. Similar to a MET WATCH for weather, BIRD WATCH alerts aircrews to possible flight hazards from increased bird activity. Pilots are then prepared to begin alternate procedures for bird avoidance as established by the BHWG. Such procedures as full stop landings only, diversions, and delays in departure may be considered appropriate for the particular threat.

Different bird densities may require varying degrees of caution. Terms such as BIRD WATCH GREEN, BIRD WATCH YELLOW, and BIRD WATCH RED may prove useful in communicating the changing nature of potential bird hazards to pilots. For example, BIRD WATCH YELLOW may denote high bird densities in locations which represent a probable

hazard to safe flying operations and specific procedures for avoidance should be used. BIRD WATCH RED could mean that high concentrations of birds present on the airfield pose an immediate hazard to aircraft and diversion procedures must be put into effect until the birds are dispersed. BIRD WATCH GREEN denotes normal operating conditions.

The Supervisor of Flying, tower personnel, or aircrews should notify the Chief of Airfield Management whenever high concentrations of hazardous birds are observed. The Chief of Airfield Management can then declare the appropriate BIRD WATCH condition and begin procedures to reduce the bird strike threat.

(5) AFR 127-15 "Bird Hazard Reduction Program," defines responsibilities for bird control. This regulation, in conjunction with Wurtsmith Regulation 55-10 should be used as a guide for the BHWG to establish and maintain a bird hazard reduction program. As part of this program, the base should document all bird strikes including aircraft type, altitude, time of day, bird species, degree of damage, repair cost, man-hours for repair, and geographic location of the strike. All bird strikes should be documented on AF Form 441, "Bird Strike Report."

Primary means of transmitting BIRD WATCH conditions to aircraft will be via ATIS (Automatic Terminal Information Service). Notices to Airmen (NOTAMS) should be used during severe situations which may affect air safety for several days. An example would be the arrival of large flocks of gulls which frequent the airfields daily in late summer. The NOTAM would remain in effect until the birds migrate south.

5. Raptors:

a. During this survey, raptors were seen only over the southwest portion of the airfield. Two Turkey Vultures (Cathartes aura) were soaring just southwest of the approach to Runway 06 at approximately 400 ft AGL. A Red-tailed Hawk (Buteo jamaicensis) was also sighted in the same area. The hawk moved slowly away from the approach corridor at about 200 ft AGL. Two Marsh Hawks (Circus cyaneus) flew over the southwest portion of the airfield near the taxiway. All of these birds are summer residents and migrate south in the fall. The airfield provides raptors with open grassland in which to hunt. Thirteen-lined ground squirrels (Citellus tridecemlineatus) and snowshoe hares (Lepus americanus) were observed on the southwest end of the airfield.

b. Recommendation: Tower personnel and Supervisors of Flying must be aware of the potential for hazards associated with raptors, especially on warm afternoons. Aircrews should be alerted to the presence of any large birds over the airfield. If pilots are aware of the presence of birds, collisions may be avoided. Birds of prey are protected under both state and federal laws, complicating control measures. With the exception of controlling their food sources or perching sites, the only available procedure is avoidance.

6. Pest Birds:

a. Aircraft hangars provide excellent habitat for House Sparrows (Passer domesticus) and Barn Swallows (Hirundo rustica) on Wurtsmith AFB. These birds nest, perch and roost in hangar superstructures and were seen in large numbers around the hangars. Their droppings are both hazardous to health and corrosive to equipment. A B-52 that had been in a hangar only four days was substantially covered with bird droppings. The birds bring nesting materials to any opening in the aircraft. This is particularly true of Starlings (Sturnus vulgaris) around the parked aircraft.

b. Recommendations:

(1) Carefully inspect aircraft. All possible aircraft access points for birds should be checked carefully for bird nesting material before use. A B-52 recently experienced problems with its air conditioning system because of bird nesting materials. Other incidents with blocked fuel cells, engine fires and electric malfunctions have been attributed to nesting material.

(2) Initiate BIRD WATCH. When swallow or sparrow flocks are in the airfield vicinity, BIRD WATCH procedures (described earlier in this report) should be used. This problem will be greatest near sunset when swallows are actively feeding and is primarily a hazard for T-37 aircraft.

(3) Insect control. If insectivorous bird flocks become a major problem, insect control will reduce both the food supply and the number of birds feeding on the airfield. Malathion should be used by base entomology personnel according to label instructions and applicable Air Force regulations.

7. Waterfowl:

a. Wurtsmith lies in the Atlantic Flyway through which millions of waterfowl pass each year. During the survey, few waterfowl were observed, and no recent records of bird strikes with waterfowl in the Wurtsmith area exist. The base Flying Safety Office has issued notices of waterfowl migration in the past (Appendix C).

b. New sewage holding ponds are presently under construction. Dimensions of the three new ponds are 36.5 m by 36.5 m, 240.7 m by 36.5 m, and 206.6 m by 36.5 m. When filled with water, these ponds may attract waterfowl and wading birds.

c. Recommendations:

(1) Continue notices of waterfowl activity. Continue to alert aircrews when spring and fall migrations occur to apprise them of

heavier bird activity both in the local area and in regions where low level missions are conducted.

(2) Implement BIRD WATCH. When waterfowl activity becomes heavy in the local area, implement BIRD WATCH procedures (described earlier in this report).

(3) Monitor the holding ponds. The new holding ponds should be checked frequently to determine if they are becoming a bird attractant. If waterfowl and shore birds are using the ponds, a wire grid pattern should be strung 12 to 18 inches above the waterline, preventing the birds from using the holding ponds. AFETO/DEVN will provide design criteria for the wire grids if the ponds attract birds.

8. Deer:

a. Wurtsmith has a problem with whitetail deer (Odocoileus virginianus) on the airfield, creating a serious aircraft strike hazard. Deer problems are not unique to Wurtsmith. For example, two deer strikes involving a Boeing 727 caused over \$500,000 damage at one airport in 1977 (reference 9). Conversations with personnel in the control tower, base operations, and security police revealed that deer use the airfield throughout the spring and summer months and during the rifle hunting season from 15-30 November each year. The base is surrounded by woods on three sides, making the airfield an ideal place for deer to browse. The barbed wire perimeter fence is not effective in keeping deer off the airfield. At the approach end of Runway 06, deer feed on the airfield and are known to cross the active runway as far up as midfield. Twenty-two deer were observed over a three-day period on the airfield and around the sanitary landfill. These figures may not be representative of the true number of deer using the airfield. A total of 49 tufts of deer hair were found along approximately one km of barbed wire fence around the approach end of Runway 06. The majority of these were on the fence running southwest of the sewage holding pond. The survey was conducted at the time of year when does are having fawns, considerably reducing activity. Heavy construction equipment installing a new ILS on the runway is disrupting deer feeding activities on the northern edge of the airfield.

b. Recommendations:

(1) Install a deer control fence. The only permanent solution to the deer problem is exclusion from the airfield. Base Civil Engineering has estimated the cost of a ten-foot chain link fence at \$10.00 per linear foot. A less expensive alternative to the chain link fence would be constructed of stock fence, eight feet high, topped with three strands of barbed wire (fig 3). This brings the total fence height to eleven feet which should exclude deer from the airfield (reference 10). A stock fence is a wire grid fence of six-inch squares which comes in rolls four feet high. The eight-foot fence would be constructed of two rolls of fencing, one roll placed on top of the other. Construct the

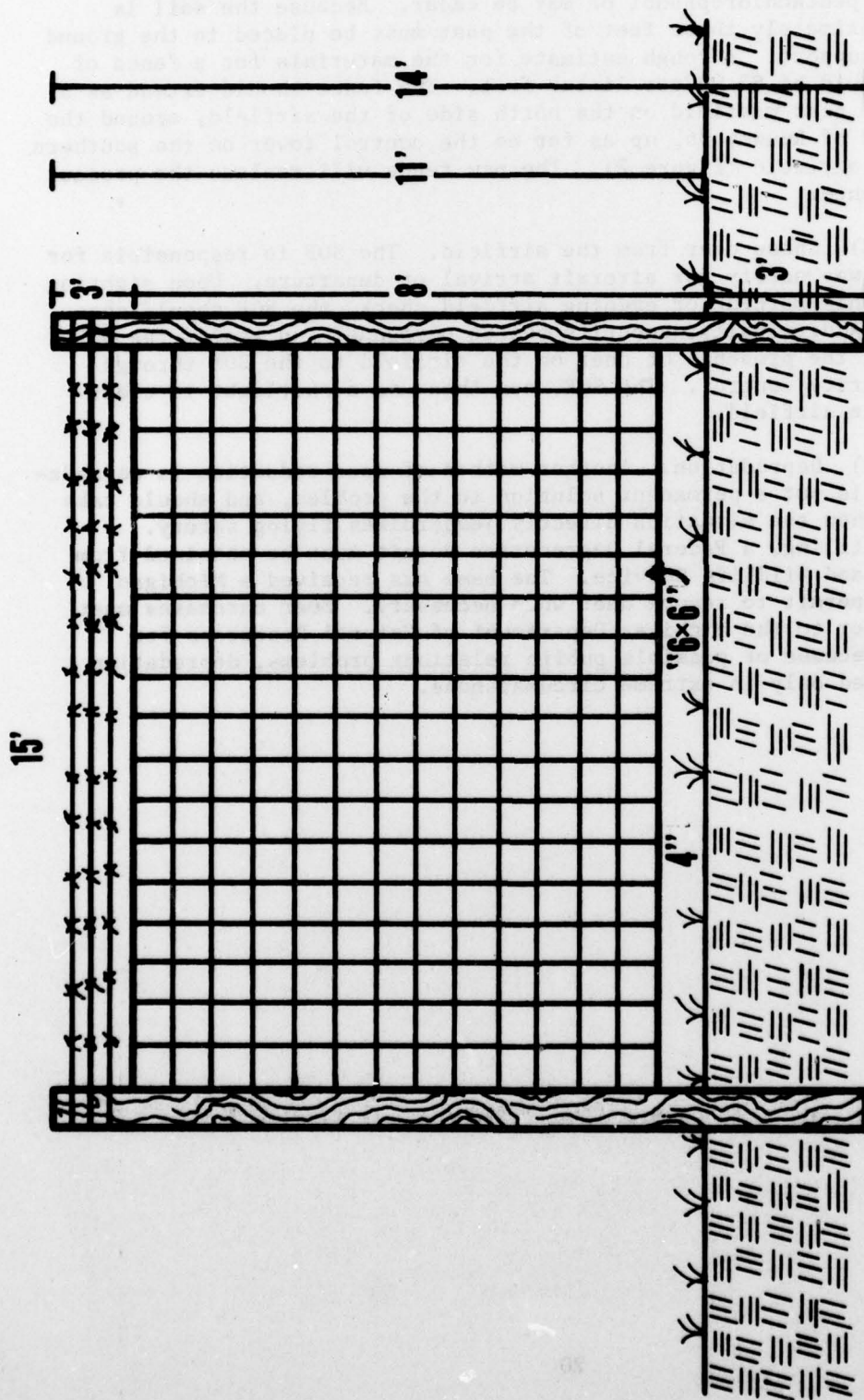


FIGURE 3
RECOMMENDED DEER CONTROL FENCE

fence, using 14-foot wooden fence posts with a minimum top diameter of four inches. The fence posts may be pine posts pressure treated with creosote or pentachlorophenol or may be cedar. Because the soil is sandy, approximately three feet of the post must be placed in the ground for proper support. A rough estimate for the materials for a fence of this type would be \$2.00 per linear foot. The fence should extend as a minimum from near midfield on the north side of the airfield, around the approach end of Runway 06, up as far as the control tower on the southern edge of the airfield (figure 2). The new fence will replace the present perimeter fence.

(2) Chase deer from the airfield. The SOF is responsible for insuring runway safety for aircraft arrival or departure. Upon sighting deer during his morning or evening airfield check, the SOF should chase them away. Additionally, security police personnel can assist the SOF by reporting the presence of deer on the airfield to the SOF through Central Security Control. The SOF, can then use a spotlight to clear deer from the airfield.

(3) Depredation. Another method of deer reduction is depredation. This is not a permanent solution to the problem, and should take place only when the situation directly jeopardizes flying safety. Before any killing, a Federal Depredation Permit must be obtained from the US Fish and Wildlife Service. The base has received a Michigan depredation permit to remove deer when necessary. Deer carcasses must be turned over to the Michigan Department of Natural Resources for disposal. Because of possible public relations problems, depredation should be used only in extreme circumstances.

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4. Burt, William H.; and Grossenheider, Richard P., A Field Guide to the Mammals, Houghton Mifflin Company Boston, 1976.
5. Land Disposal Sites Airports, Reporting Bird/Aircraft Hazards, Environmental Protection Agency, Open-File Report (TSR 1.6.004/0), 1971.
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APPENDIX A

BIRD STRIKES, WURTSMITH AFB MI - 1970 THROUGH 1978

Date	Aircraft	Phase of Flight	Time of Day	Dollar Loss	Man-Hours	Bird Identification	Remarks
70-05-02	C-47D	Landing	Day	16	5	Brown	Wing
72-04-24	B-52H	Low Level	Day	93	36	Unknown	Wing
74-09-18	B-52H	Low Level	Day	838	12	Ducks	Windshield
74-09-26	KC-135A	Landing	Night			Goldfinch	Landing Gear Struts
74-09-26	KC-135A	Landing	Night				Main Flap, Landing Gear
74-10-01	B-52H	Initial Climb	Day	8,876	48	Small Brown	Engine
74-10-22	KC-135A	Landing	Night	11,069	4		Engine
75-03-20	KC-135A	In Flight	Day	100	12		Radome
76-04-16	B-52H	In Flight	Night	40	20		Wing
76-05-17	B-52H	In Flight	Night	390	1		Engine
76-11-19	B-52H	Unknown		30			Vertical Stabilizer
77-03-07	B-52H						
77-04-08	B-52H						
77-7-14		Touch and Go		37,053		Gull	Engine & Radome
77-08-25	KC-135A	Traffic Pattern					
77-08-30	B-52H	Final Approach					
77-09-02	B-52H						
77-09-13	B-52H	Takeoff					
77-09-27	B-52H						
77-09-28	KC-135A	Final Approach					
77-10-14	KC-135A						
77-10-14	B-52H	In Flight		5,028			Radome
77-10-03	B-52H	In Flight		5,858		Ducks	Radome, Engine Cowling
77-10-19	B-52H						
77-11-04	KC-135A	Landing					
78-04-07	B-52H	Final Approach		5,683		Gulls	Radome
78-04-26	B-52H			\$75,074	138		

APPENDIX B

DEPARTMENT OF THE AIR FORCE
Wurtsmith Air Force Base, MI 48753

Wurtsmith AFB Regulation 55-10
1 February 1978

Operations

BIRD CONTROL

This regulation outlines procedures to minimize the chance of bird strikes on or near the runway.

1. GENERAL: Birds, primarily seagulls, are a constant threat to aircraft. They tend to flock during the summer and fall seasons. Dumps and garbage in the local area and along lake shorelines provide a natural attraction. Seagulls tend to flock on concrete surfaces early in the morning, in the evening, and during periods of low overcast and low visibility. The base runway, ramps and taxiways are attractions because of the relative warmth provided. A variety of methods are available to disperse unwanted birds. These include shooting and poisoning. (A permit is required from the U. S. Fish and Wildlife Service to kill seagulls which are a protected species.)

2. RESPONSIBILITIES:

a. Chief, Airfield Management (OTM) is the OPR for Airfield Bird Control activities.

b. OTM maintains on file a current:

(1) U. S. Fish and Wildlife license/permit.

(2) State of Michigan Department of Natural Resources Damage Control permit.

(3) Record of birds killed. (This record is reported to the U.S. Fish and Wildlife Service NLT 10 Jan each year.)

c. Base Operations insures personnel involved in bird control operations are familiar with the safe use of firearms and the poison, Avitrol.

d. Base Operations notifies Tower & CSC when firing is scheduled.

3. PROCEDURES:

a. OTM is advised by the Tower, SOF, Command Post, aircraft or other source when seagulls are on the airfield.

OPR: OTM/6251
DISTRIBUTION: F

b. The senior OTM dispatcher on duty will notify the Tower and CSC of intended activity. Prior notification will not be necessary for use of the poison Avitrol, unless operations are near the runway.

c. Base Operations personnel will proceed to the bird hazard area with a weapon or the poison, Avitrol, and a plastic bag.

d. Firing, when necessary, will be conducted by designated OTM personnel and will not be in the direction of aircraft, structures or persons.

e. Dispersal activity will include, when necessary, the killing of only enough birds to frighten the flock from the airfield. (Note: after a killing, seagulls tend to circle above the dead birds for a while, then depart.)

f. Dead birds will be placed in a plastic bag. The bag will be placed in a dumpster for burial, as required by Federal and State permits.

g. The senior OTM dispatcher will maintain a log of birds killed.

h. "Shell Crackers" procedures will be the same as shotgun procedures. (Shell Crackers are a delay explosive shell, after firing the charge travels approximately 70 ft. and then explodes.)

FOR THE COMMANDER

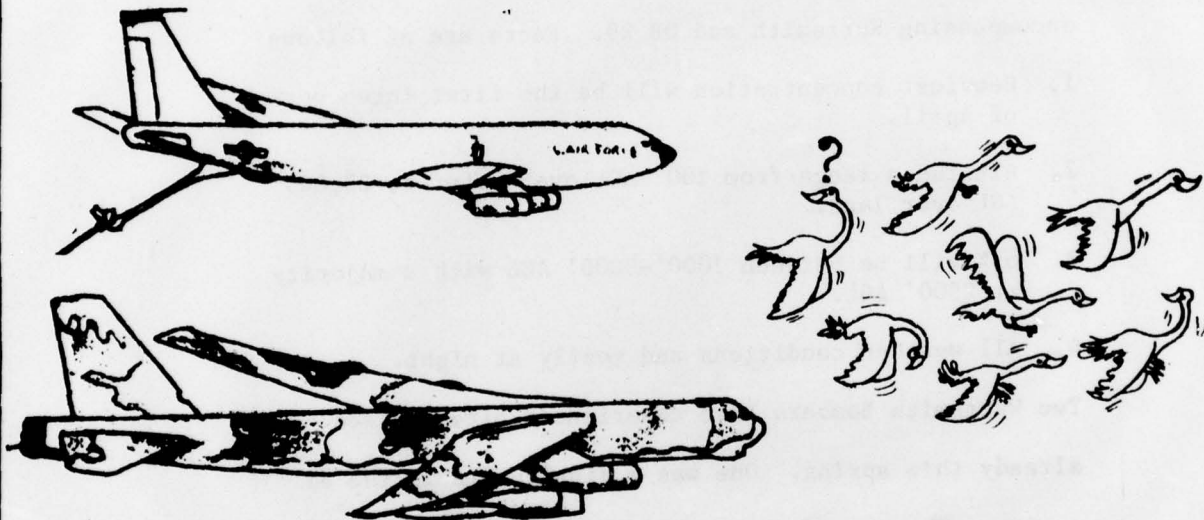
Lee B. Grant

LEE B. GRANT, Captain, USAF
Chief, Central Base Administration

SAC MISAP PREVENTION BRIEF



ISSUED BY:	ISSUE DATE:	NUMBER:
379BMW/SE	5 May 1978	F-78-3



IMPROVE YOUR ODDS.

1. Wear the clear visor.
2. Stay above 12,000 as long as possible.
3. Report Bird activity on low level routes. to controlling agencies so they can pass info on to other crews.
4. Pre brief Emergency Actions to include:
 - a. Lost cockpit communications.
 - b. Aircraft control and maneuvering after strike.
 - c. Incapacitated pilot.
 - d. Recovery.
 - e. Low altitude ejection.

EXPIRES: 31 July 1978

ATTENTION

Between 1 March and 30 April an estimated 1,600,000 ducks, geese, and/or swans will migrate thru the area encompassing Wurtsmith and OB 29. Facts are as follows:

1. Heaviest concentration will be the first three weeks of April.
2. Altitudes range from 100' AGL over water to 20,000' AGL over land.
3. 67% will be between 1000'-3000' AGL with a majority at 2500' AGL.
4. All weather conditions and mostly at night.

Two Wurtsmith Bombers have experienced bird strikes already this spring. One was a single bird in the #1 engine. The second involved four birds one of which cracked the STV window costing \$4449.00. Although you may carry a duck stamp, they are out of season so beware our feathered friends.

APPENDIX D

BIRDS OBSERVED AT WURTSMITH AIR FORCE BASE

Herring Gull	<u>Larus argentatus</u>
Ring-billed Gull	<u>Larus delawarensis</u>
Starlings	<u>Sturnus vulgaris</u>
Eastern Kingbird	<u>Tyrannus tyrannus</u>
American Goldfinch	<u>Spinus tristis</u>
Turkey Vulture	<u>Cathartes aura</u>
Killdeer	<u>Charadrius vociferus</u>
Cliff Swallow	<u>Perrochelidon pyrrhonota</u>
Common Crow	<u>Corvus brachyrhynchos</u>
Red-winged Blackbird	<u>Agelaius phoeniceus</u>
Robin	<u>Turdus migratorius</u>
Red-tailed Hawk	<u>Buteo jamaicensis</u>
Mourning Dove	<u>Zenaidura macroara</u>
Brown-headed Cowbird	<u>Molothrus ater</u>
Blue Jay	<u>Cyanocitta cristata</u>
Yellow-shafted Flicker	<u>Colaptes auratus</u>
Horned Lark	<u>Eremophila alpestris</u>
Marsh Hawk	<u>Circus cyaneus</u>
Brown Thrasher	<u>Toxostoma rufum</u>
Domestic Pigeon	<u>Columba livia</u>

DISTRIBUTION LIST

HQ USAF/LEE			AFPCB/MEIS	
Washington DC 20330	3		Forest Glenn Section	
			Washington DC 20012	1
HQ USAF/XOO			OEHL/CC	
Washington DC 20330	1		Brooks AFB TX 78235	1
AFISC/IGD			AFOSR	
Norton AFB CA 92409	1		Bolling AFB DC 20330	1
AFISC/SEF			USAF Rgn Civ Engrg	
Norton AFB CA 92409	2		630 Sansome Street	
AFRES/DEEE			San Francisco CA 94111	1
Robins AFB GA 31098	1		USAF Rgn Civ Engrg	
USAF/DEV (Col D. Reaves)			526 Commerce	
USAF Academy CO 80840	1		Atlanta GA 20303	1
AUL			USAF Rgn Civ Engrg	
Maxwell AFB AL 36112	1		1114 Commerce	
DDC/TCA			Dallas TX 75202	1
Cameron Station			Federal Aviation Admin	
Alexandria VA 22314	12		AAS/720	
USAF OEHL/EC			800 Independence Avenue	1
Attn: Maj Thalken			Washington DC 20591	
Brooks AFB TX 78235	1		379 CSG/OT	
HQ SAC/DE			Wurtsmith AFB MI 48753	1
Offutt AFB NE 68113	1		379 CES/DEEV	
SAMSO/DEV			Wurtsmith AFB MI 48753	1
Attn: Maj Wooten			379 CES/DEEV	
P.O. Box 92960			Wurtsmith AFB MI 48753	1
Worldway Postal System			379 CSG/DO	
Los Angeles CA 90009	1		Wurtsmith AFB MI 48753	1
379 CSG/CC			CEEDO/ECM	
Wurtsmith AFB MI 48753	1		Tyndall AFB FL 32403	1
379 CSG/SE			AFETO/OI	
Wurtsmith AFB MI 48753	1		Tyndall AFB FL 32403	1
379 CSG/SEF			AFETO/DEV	
Wurtsmith AFB MI 48753	1		Tyndall AFB FL 32403	1
379 CSG/OT			AFETO/XRL	
Wurtsmith AFB MI 48753	1		Tyndall AFB FL 32403	1
			AFETO/DEVN	
			Tyndall AFB FL 32403	15